Master of Science, Advanced Architectural Design

Arch[e]ology

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Cornell AAP
Architecture Art Planning

Architecture and Ecology

Architecture as an interface

Architecture, for me, is an interface capable of re-bridging the connection between nature and the manmade world. Architecture, instead of a lifeless container for human beings, is a diverse, complex system or infrastructure that can adapt to our surroundings. It can not only accommodate humans, but also has the potential to mitigate environmental dilemmas or, minimally, increasing awareness of them. During my territory of investigation at Cornell, a multidisciplinary approach is indispensable, since it empowers architecture to be explored more innovative possibilities and experimental practices.

Within this year, I specifically focus on five different relationship between ecology and architecture through exploring the intersection of human civilization and the natural world. They utilized various methodologies approaching to architecture, including ecological research with insects and algae, specific site research in Harlem neighborhood, Washington Square park, industrial zone in Armenia, and experimental process related to augmented and virtual reality for producing digitalized ecology.

Arch[e]ology refers to the interface between architecture and ecology, which concludes the design projects I was involving throughout my study at Cornell. It aims to present interdisciplinary aspect of architecture, and conveys the notion of architecture nowadays is boundary-less. It is potentially able to transform the modern architectural typology, to overturn the architecture we have being taken for granted, and to rethink the problematic issues within our society.

From the last summer semester, I was engaged in several different approaches to architecture and ecology.

First of all, within an expanded understanding of ecology, the architectural and infrastructural possibilities that appear from the close examination of intersecting systems of waste and energy could actually be generated. The Future-oriented Protein Cultivation was a project proposing a protein factory cultivating cricket and micro-algae as an alternative protein source in the future. The aim of the design was to develop an innovative mutualistic system approach at the intersection between architecture, infrastructure, and ecology. I was exploring an expanded idea of ecology that includes not just the natural environment but also recognizes the complications of human-made products and byproducts. As a whole, the studio was taking ecology as a circular system of inputs and outputs that include everything from organic materials, such as micro-algae, insects, or water to human trash and energy demands. I tried to interpret a synthetic understanding of them in relationship to one another within a more extensive system of mutual benefits and tradeoffs. I began by comparing traditional methods of protein cultivation with novel emerging techniques, including cricket and micro-algae cultivation. Strikingly, these alternatives require a much lower input of land, water and feed to produce a single ton of protein output. Moreover, in terms of health, crickets and micro-algae have a greater percentage of protein content: 80% and 96%, respectively, compared to a maximum of 55% achieved using traditional meat cultivation methods. The infrastructure system is becoming part of the ecology of the city, which re-bridges the connection between nature and the man-made world. As these "food-chain linked" systems come across each other, opportunities appear as conflicts are negotiated, resulting in turn to a more flexible and opportunistic design approach.

In contrast, the Urban Forum project is another example that illustrates the ecology within an urban area. Instead of investigating an ecological system between human and nature, the project was based on the research and analysis of the site itself through a review of relevant discourse and an overview of both historic and contemporary conditions of the local ecology around Park Avenue. Thus, I discovered the problematic issue at Park Avenue from 116th to 135th street, which is covered by an overground railway system. Because of this, Park Avenue is suffering from several problems, especially those areas under the railway, including wastelands, seedy spaces, parking spaces, and vehicle disposal. In addition, the huge rail track barrier has not only blocked the pedestrian network, but also deprives the chance of producing urban synergies. Therefore, after analyzing the community, the concept of "Urban Forum" was proposed, which mainly serves as an educational program for East Harlem neighborhood. The forum program will

augment and revitalize this area, and provide platforms to exhibit, to share, to learn for individuals, which supports the neighborhood and enhances the social connectivity between man and nature. Simultaneously, it also allows the outsiders to explore this unique urban ecology. Through looking into the fundamental problem of a specific site, I was able to see how architecture can have a larger significance at an urban scale, while engaging the challenges of a city or an ecology that is becoming less accessible for an increasingly diverse and complex citizenry.

Moreover, another project I was engaging in using a similar design methodology is the Knowledge Village. It was based on the research and analysis of Washington Square Park and its surrounding urban area. I specifically proposed a new typology of libraries to respond to the site and its ecology where is not truly open to the public in terms of educational resources. The project proposes learning common in Washington Square Park to create a concept of "Knowledge Village" in Manhattan where the place provides the public with knowledge through sharing to each other. It is a place where the citizen and university students, as well as institution are able to jointly share their ideas, and thus create social, intellectual, and cultural products. The proposal creates educational components as the main unlimited access sharing spaces in Washington Square Park, a high-density area of New York City. Each component acts as an information factory, which endows students and institutions with opportunities to share knowledge.

In addition to researching the natural and urban ecology, with the support of technology, I was also endowed with the opportunity to incorporate the design of an augmented reality between human and nature, which provides a possible meditated recreational experience in the near future. I was involved in creating new forms of mediated recreational experiences through manipulating augmented reality software, such as Cinema 4D, for testing the potential composition of architecture and ecology in a sort of technological manner. Likewise, it was also based on the research of local ecology, which I realized that both the golf course and zoological garden share the unhealthy manner in terms of development for human to exploit, the term "nature" in this park is similar to a plunder for individuals. Therefore, the project proposes alternative activities in terms of recreation with augmented reality experience for the public to redefine how the golf course and zoological garden could be transformed into the next stage, and thus bring the public together engage in this new ecological venue. At the initial phase, a camouflage pixelized landscape defines fairways, mimicking a sort of protection or boundary from driving ranges or cages for animals. By the impacts of scenic views and acoustic process from animals, the field of pixels are triggered, and those pixels re-oriented into forms of animal from invisible to visible

mode. It allows people to experience the transformation from audio into vision through reading the image scape of Delaware Park. In the long term, the golf course and zoological garden can be abandoned. People can truly embrace this augmented technology, which alleviates the unsound phenomenon of consumerism towards nature.

Last but not least, the industrial ecology is the field I was exploring throughout the last semester. The site is one of the many factory complexes in the Republic of Armenia. Once a largely agrarian society before the Soviet takeover, under Stalin and his successors, Armenia became one of the world's rapidly industrialized countries. Thus, I was diving into the ecology between human and machines within the factories. The proposal is to retool the factories, and the city around it, using both the absolute machines found locally and the population whose only skill is to operate those machines. It incorporates the design of an interface between machine and human, which provides a possible solution for rejuvenating the industrial ecology of Charentsavan in Armenia. The project aims to bring everyone together to celebrate Charentsavan as an industrial city in Armenia.

In summary, with these several different aspect of approaches to architecture and ecology, architecture acts an interface has ability to re-join the link between nature and the manmade. Through this process, architecture has a much greater ability and power to complement the existed ecology we live in and to adapt with the constantly changing built environment.

Future-oriented Protein Cultivation, 2018

Instructors / Tei Carpenter, Jesse LeCavalier
Location / Roosevelt Island, New York, NY

This project proposes a protein factory cultivating cricket and micro-algae as an alternative protein source in the future. The site is loacated at the waterfront area of Roosevelt Island. The aim of the design was to develop an innovative mutualistic system approach at the intersection between architecture. infrastructure, and ecology.

Compared to traditional methods of protein cultivation, emerging techniques, including cricket and micro-algae cultivation, requires a much lower input of land, water and feed to produce 1 ton of protein output. Also, in terms of health, crickets and micro-algae have a greater percentage of protein content: 80% and 96%, respectively, compared to a maximum of 55% achieved using traditional meat cultivation methods.

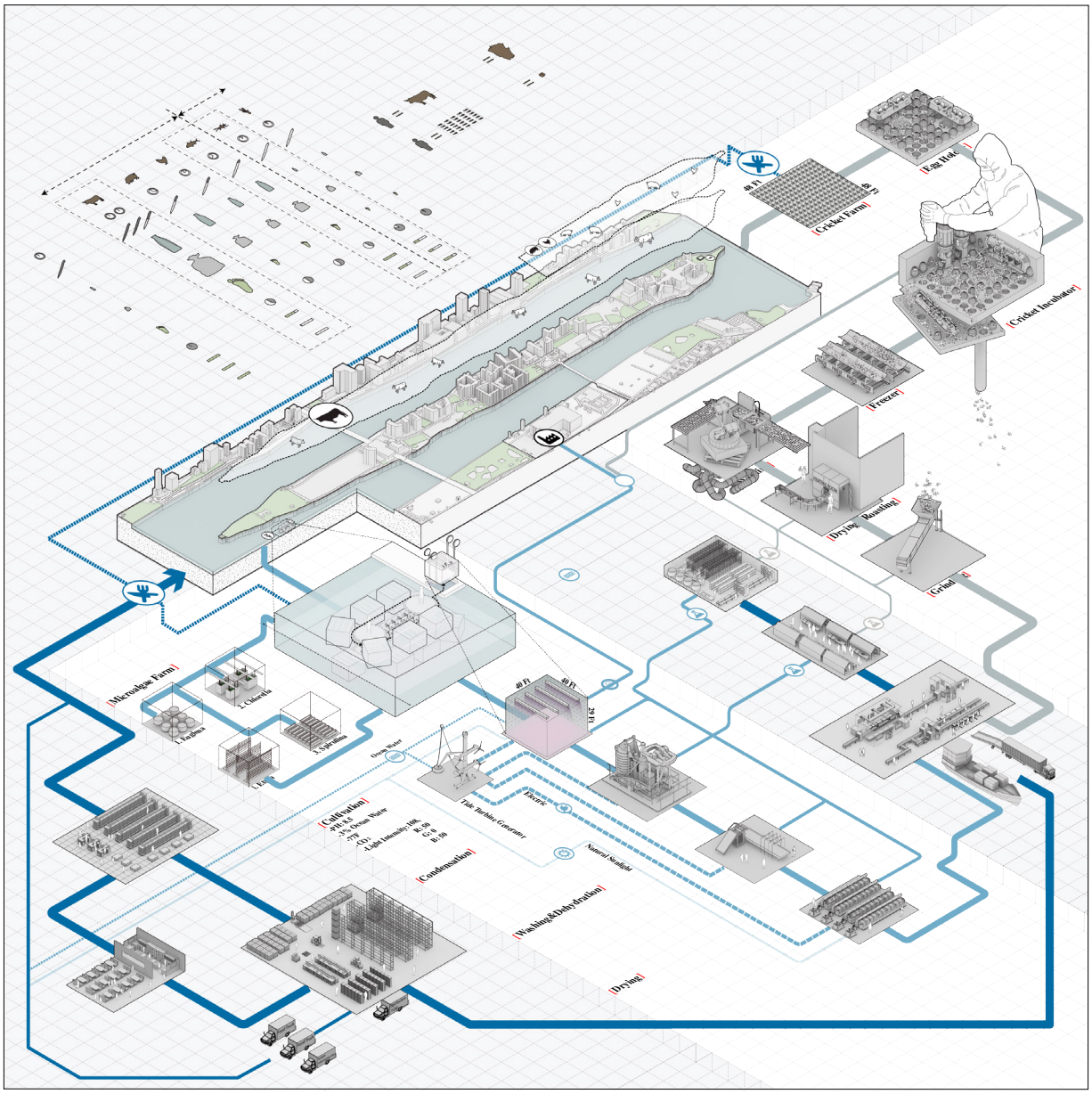


Fig. 1 Systematic drawing to show the relationship between micro-algae, cricket and the factory.

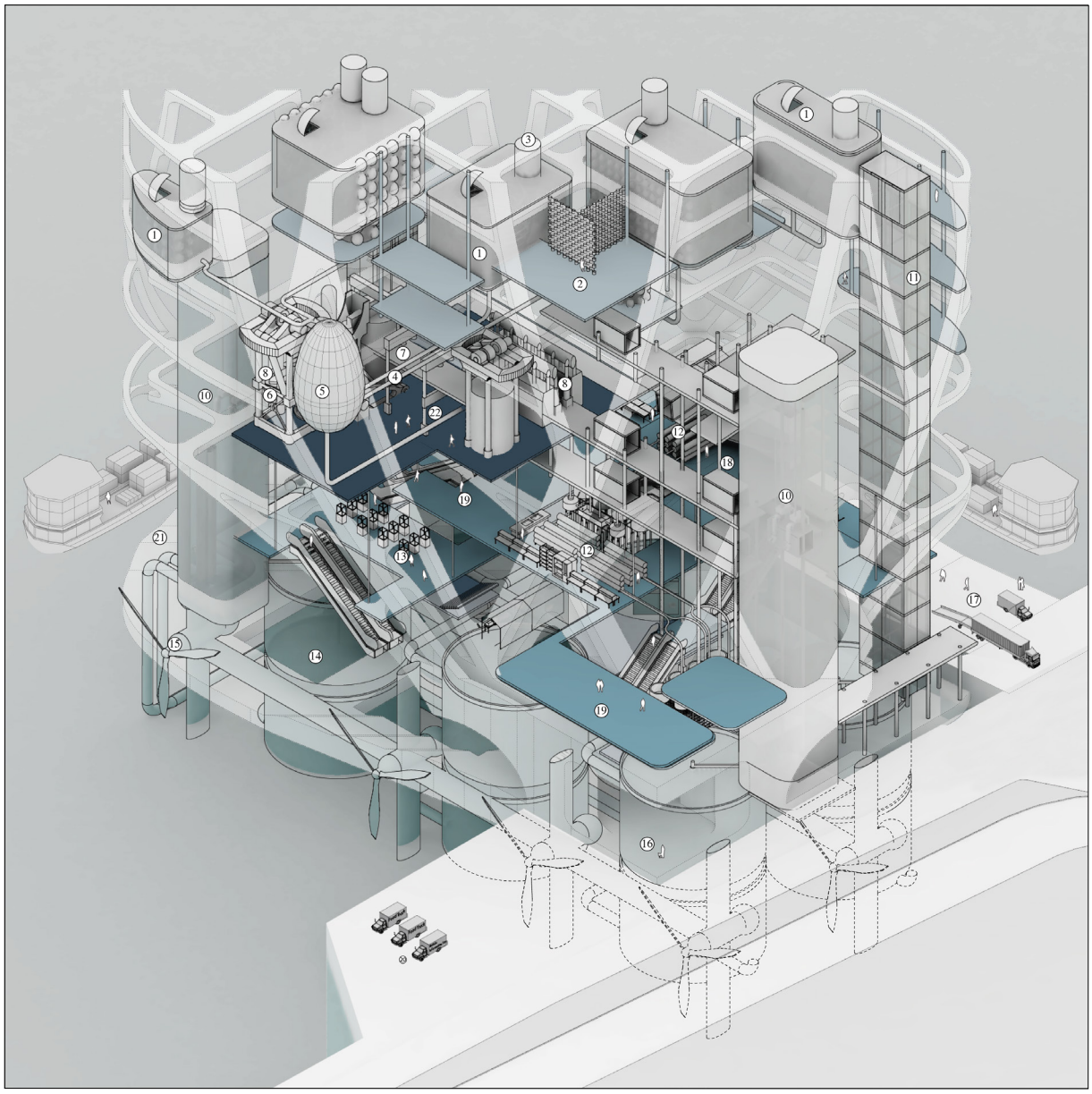


Fig. 2 Isometric Drawing

1	Cricket Incubator	12	Laboratory
2	Cricket Farm	13	Exhibition
3	Cricket Water Tank	14	Micro-algae Farm
4	Cricket Vacuum System	15	Tide Turbine Generator
5	Cricket Green House	16	Entrance
6	Condenser	17	Loading Dock
7	Washing & Dehydration	18	Hybrid Food Research
8	Dryer	19	Event Space
9	Conveyor Belt	20	Media and Publicity Trucks
10	Vertical Service Core	21	Public Plaza
11	Public Elevator	22	Public Information Tour

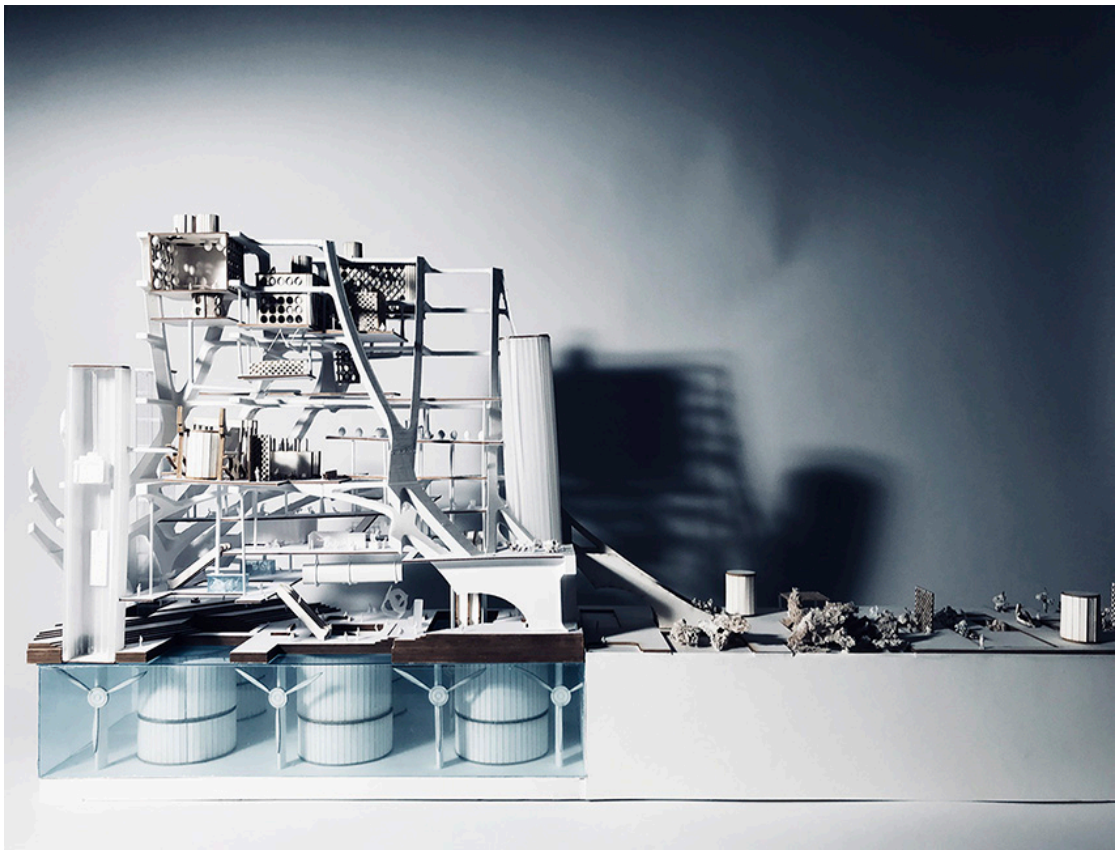


Fig. 3 (top) Sectional model
Fig. 4 (bottom) Sectional model

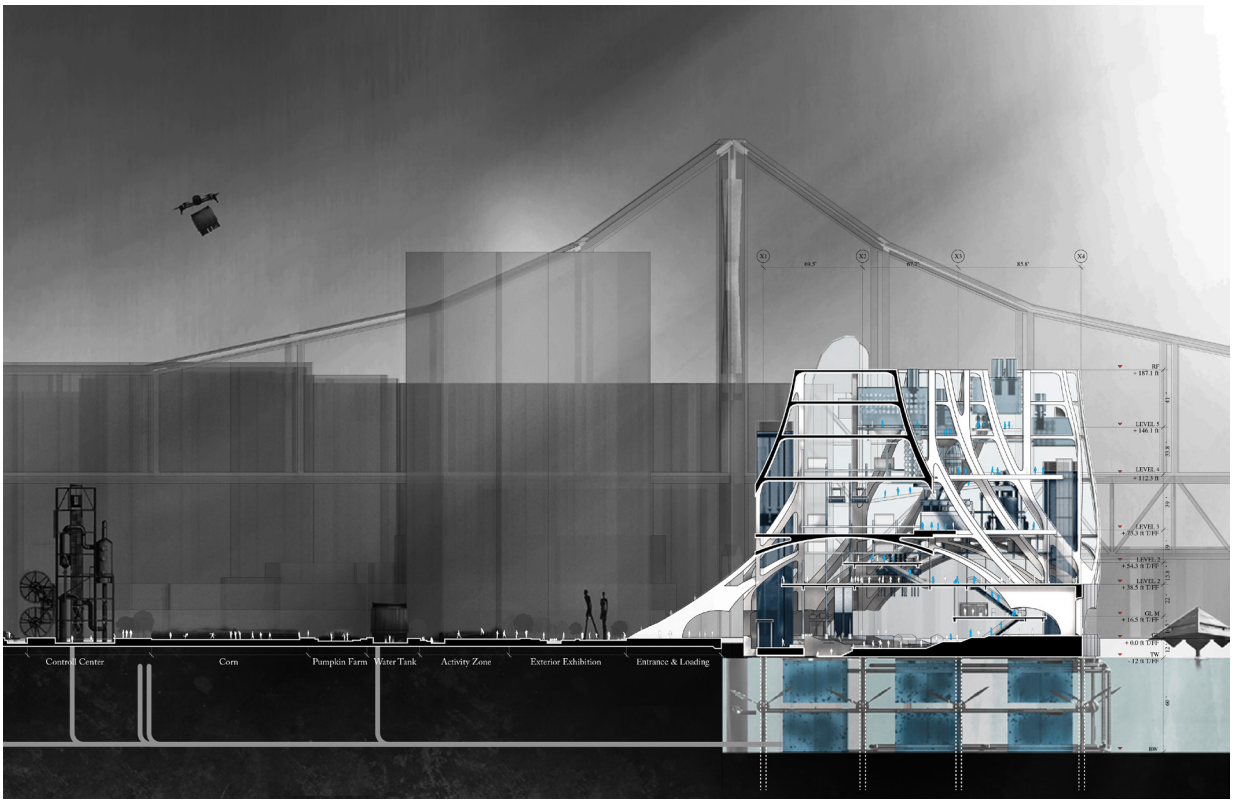
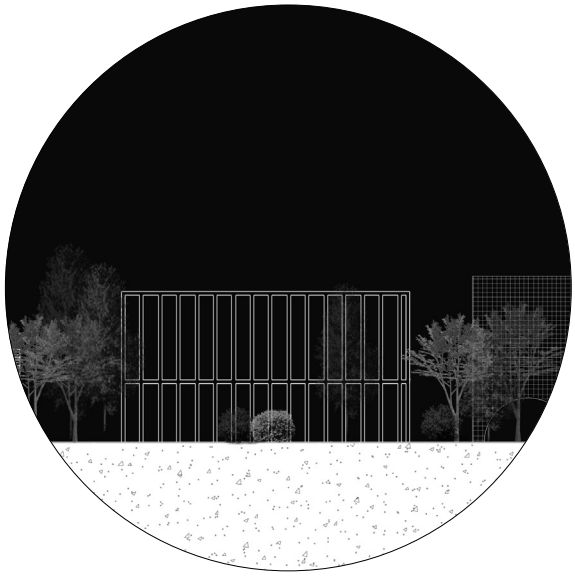


Fig. 5 Perspective sectional drawing

Knowledge Village, New York, New York, 10012, 2018



Instructors / Michael Young, Kutan Ayata
Location / Washington Square Park, New York

The project proposes learning common in Washington Square Park to create a concept of "Knowledge Village" in Manhattan where the place provides the public with knowledge through sharing to each other.

The knowledge village, a new typology of libraries, is a place where the citizen and university students, as well as institution are able to jointly share their idea, and thus create social, intellectual, cultural products.

The proposal create educational components as the main unlimited access sharing spaces in Washington Square Park, a high density area of New York City. Each component acts as an information factory, which endows students and institutions with opportunities to share knowledge.

The knowledge would be exhibited, introduced and celebrated in the public spaces, which creates not only one of the educational hub for citizen in New York, but also a large idea-sharing zone in the city.

Fig. 6 Perspective elevational drawing

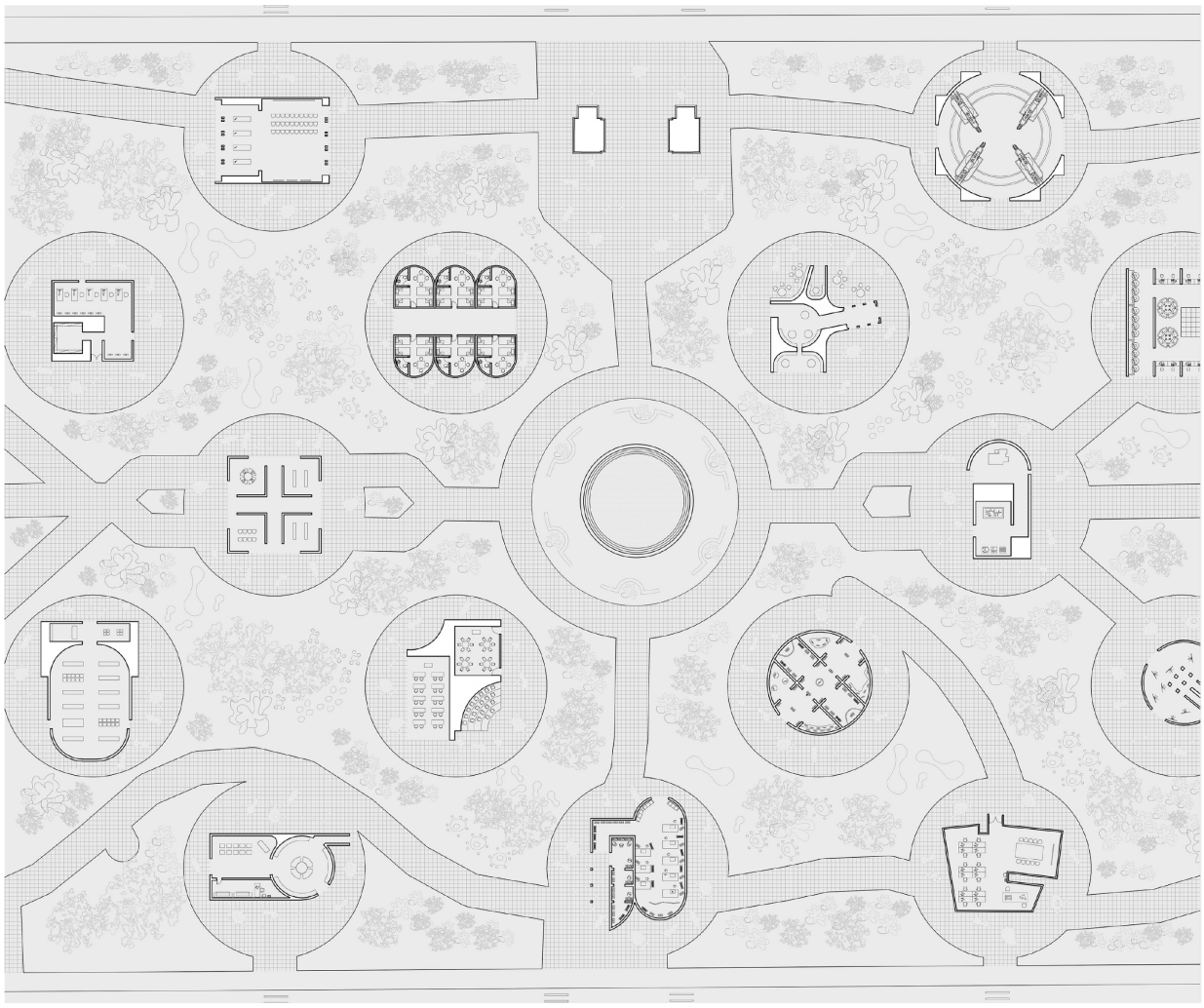
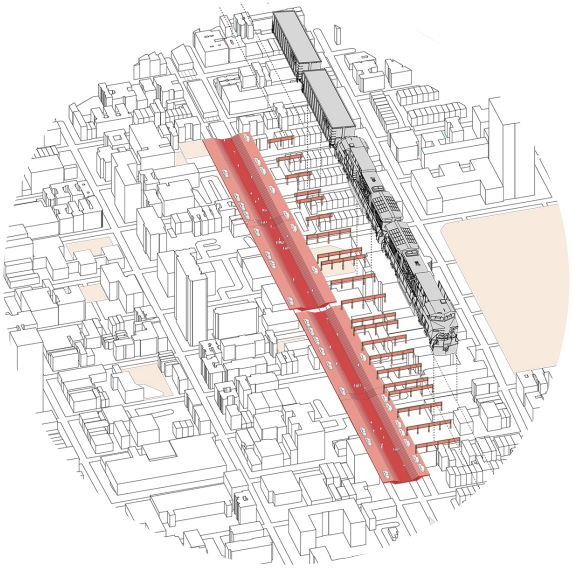


Fig. 7 Master plan

Urban Forum, 2018



Instructors / Nahyun Hwang, David Eugin Moon
Location / Park Avenue from 116th to135th Steet, NY

This project proposes an alternative public space to redevelop and reconnect the neighborhood of East Harlem, which provides the public with opportunities to share knowledge and socialize with each other, and thus accelerate urban synergy within the area.

The site is located at Park Avenue from 116th to 135th street, which covered by an overground railway system. Because of that, Park Avenue is suffering from several problematic, especially those areas under the railway, including wastelands, seedy spaces, parking spaces, vehicle disposal. Moreover, the huge rail track barrier not only has blocked the pedestrian network, but also deprive the chance of producing synergies.

After analyzing the community, the concept of Urban Forum is proposed, which mainly serves as an educational program for East Harlem neighborhood. The Forum program will augment and revitalize this area, and provide platforms to exhibit, to share, to learn for individuals, which supports the neighborhood and enhances the social connectivity. Simultaneously, it also allows the outsiders to explore this unique community.

The design bridges the pedestrian network between two corridors and revitalize the surrounding vacant places. Furthermore, with the hyperloop system, it will not only minimize the noise, but also enhance the connectivity between city and city. The new rail track will gather various educational resources and be an open book to the public in the neighborhood.

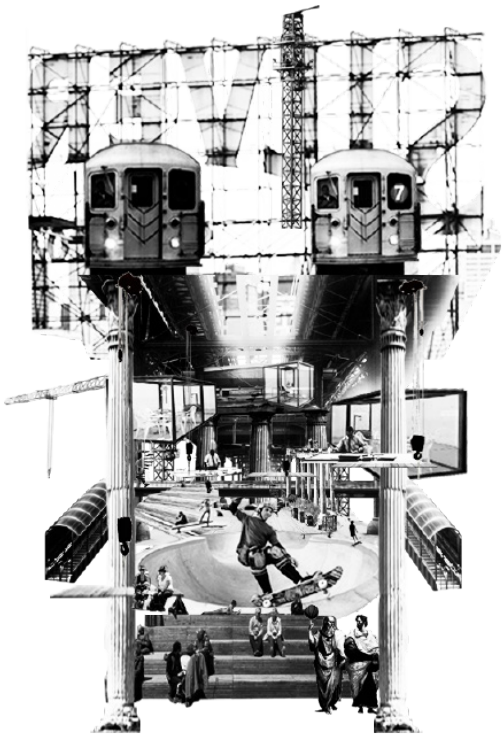


Fig. 8 Collage

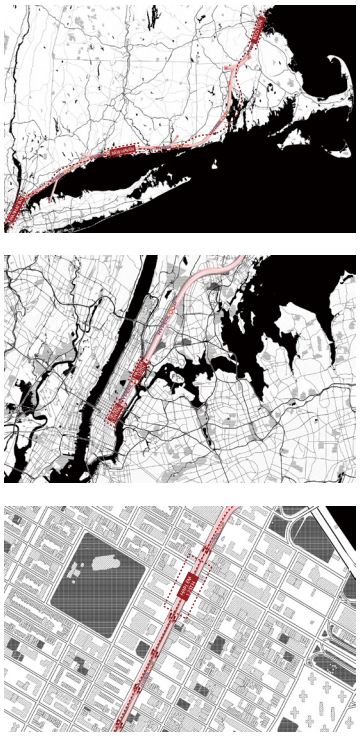
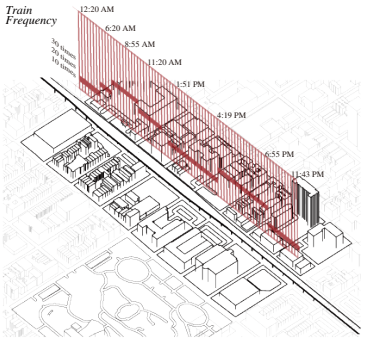
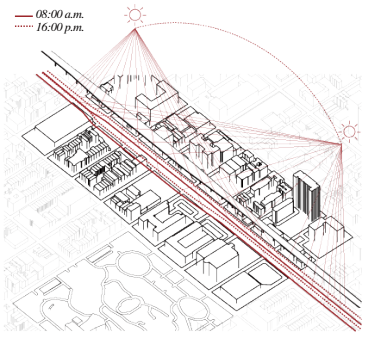


Fig. 9 Enhance the Connectivity: Bring Educational Resources from Other Cities

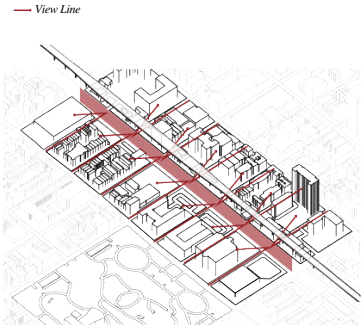
Fig. 10 East Harlem: Barrier of the City



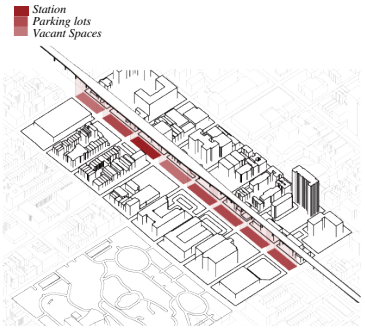
Noise Frequency



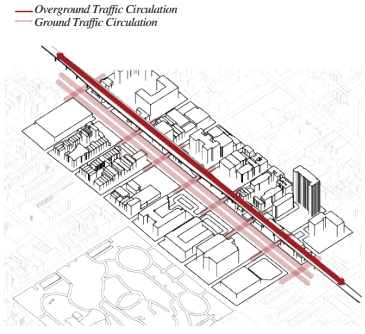
Solar Analysis



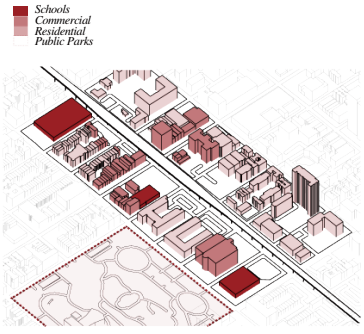
View Accessibility



Spaces Underneath

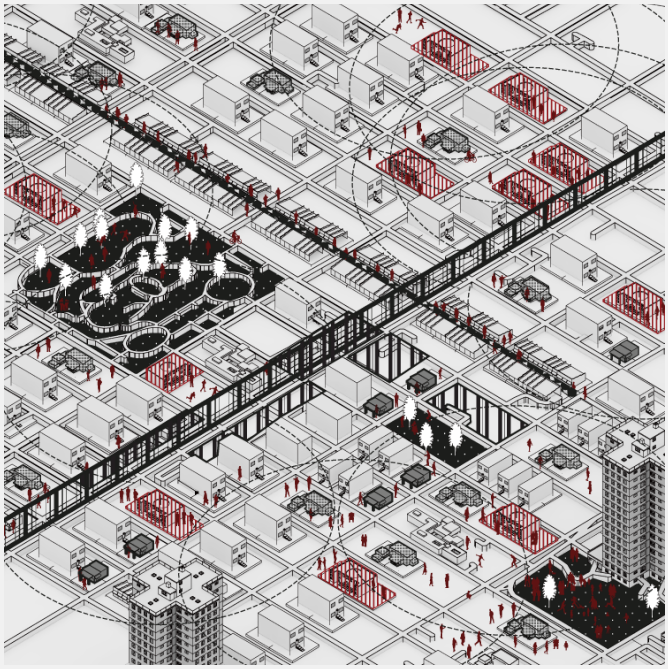


Traffic Analysis



Neigborhood Zoning

Fig. 11 East Harlem Existed Program Analysis



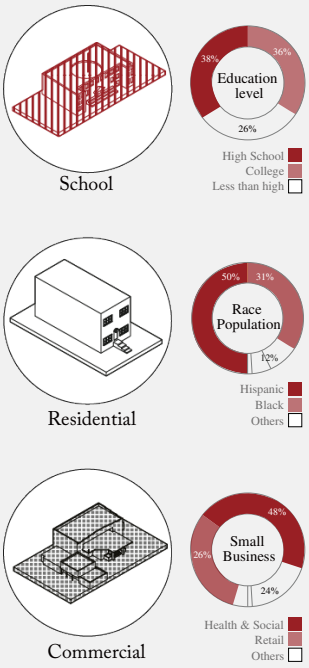


Fig. 12 New Connector at East Harlem

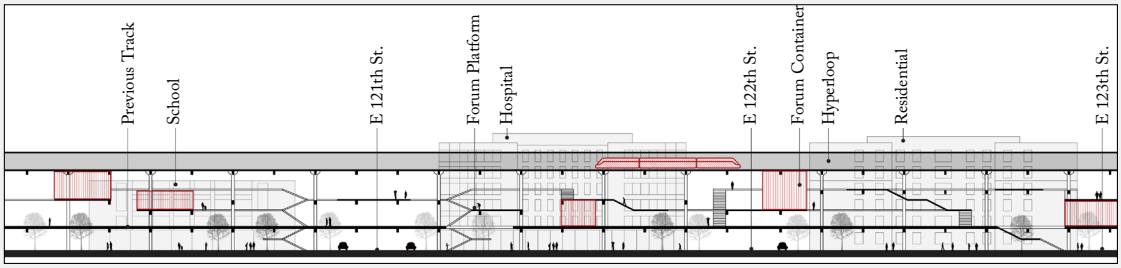
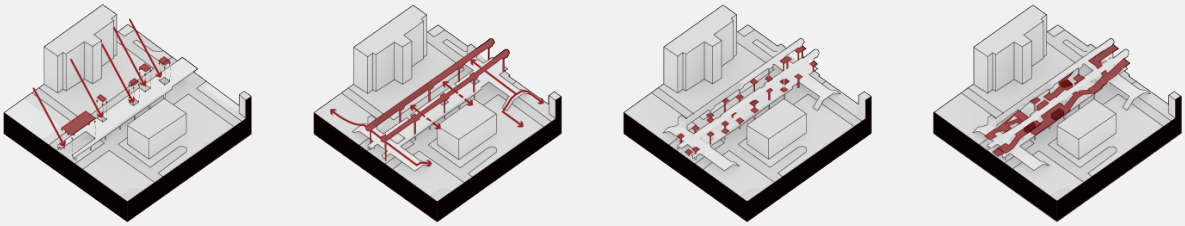


Fig. 13 Forum Design Strategy



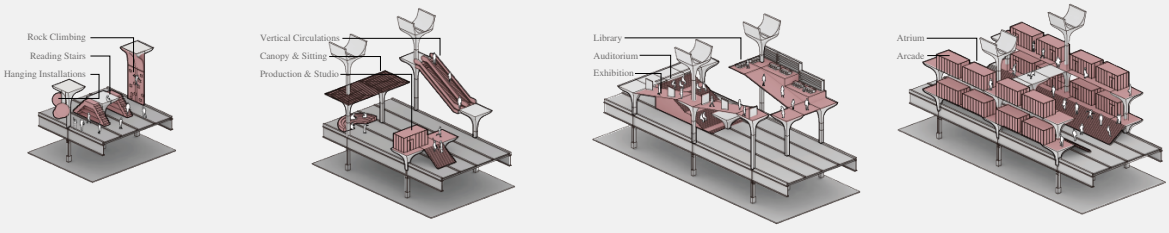
Preserve and Carve the Rail Track

Lift up the Railway & Enhance the Pedestrian Connection

Floating Columns

Centralized Civic Educational Forum

Fig. 14 Forum Unit Formations



Single Column

Dual Columns

More Columns

More Columns

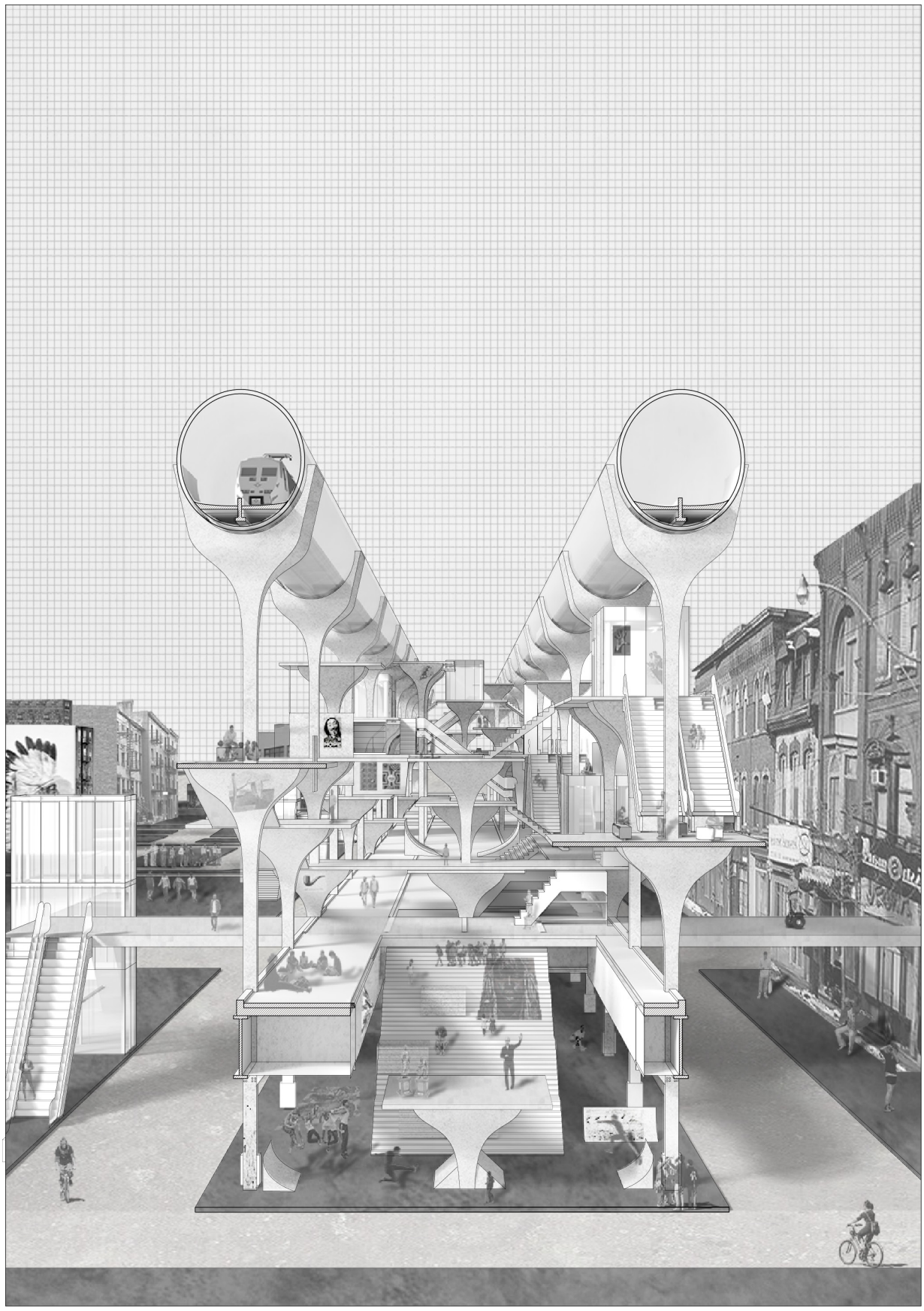


Fig. 15 Perspective sectional drawing

Cube-scape, 2018

Instructor / John Zissovici
Location / Buffalo, New York

The project incorporates the design of an augmented interface (reality) between human and nature, which provides a possible meditated recreational experience in the near future.

The site is located at a golf course and a zoological garden in Olmsted's Delaware Park in Buffalo. Because the golf course and zoo share the unhealthy way in terms of development for human to exploit, the term "nature" in this park is similar to a plunder for individuals.

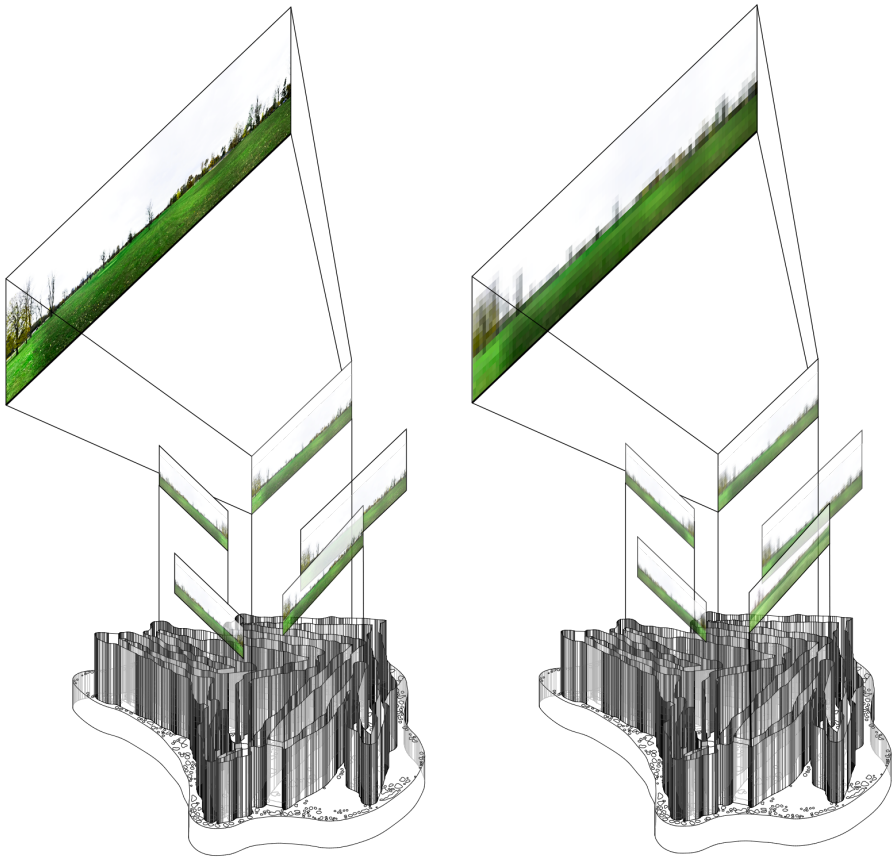
The project proposes alternative activities in terms of recreation with augmented reality experience for the public to redefine how the golf course and zoological garden could be transformed into the next stage, and thus bring the public together engage in this new park.

At the initial phase, a camouflage pixelized landscape defines fairways, mimicking a sort of protection or boundary from driving ranges or cages for animal. By the impacts of scenic views and acoustic process from animal, the field of pixels are triggered, and re-oriented those pixels into forms of animal from invisible to visible mode. It allows people to experience and figure the transformation from audio into vision through reading the image scape of Delaware Park.

In the long term, the golf course and zoological garden can be abandoned. People can truly embrace this augmented technology, which alleviates the unsound phenomenon of consumerism towards nature.

Fig. 16 Cube-scape rendering

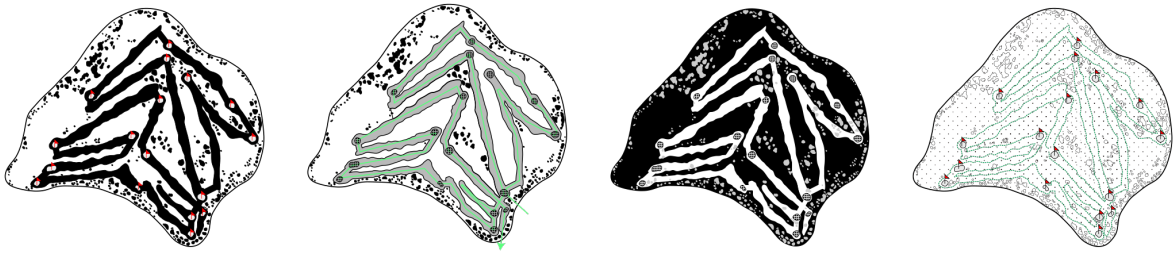
Fig. 17 Image-scape



Panorama Landscape

Pixelized Panorama Landscape

Fig. 18 Golf course analysis



Fairway
Flagstick (Target)

Circulation
Putting Green

Rough
Vegetation

The Interface
Boundary Redefinition (Pixels)

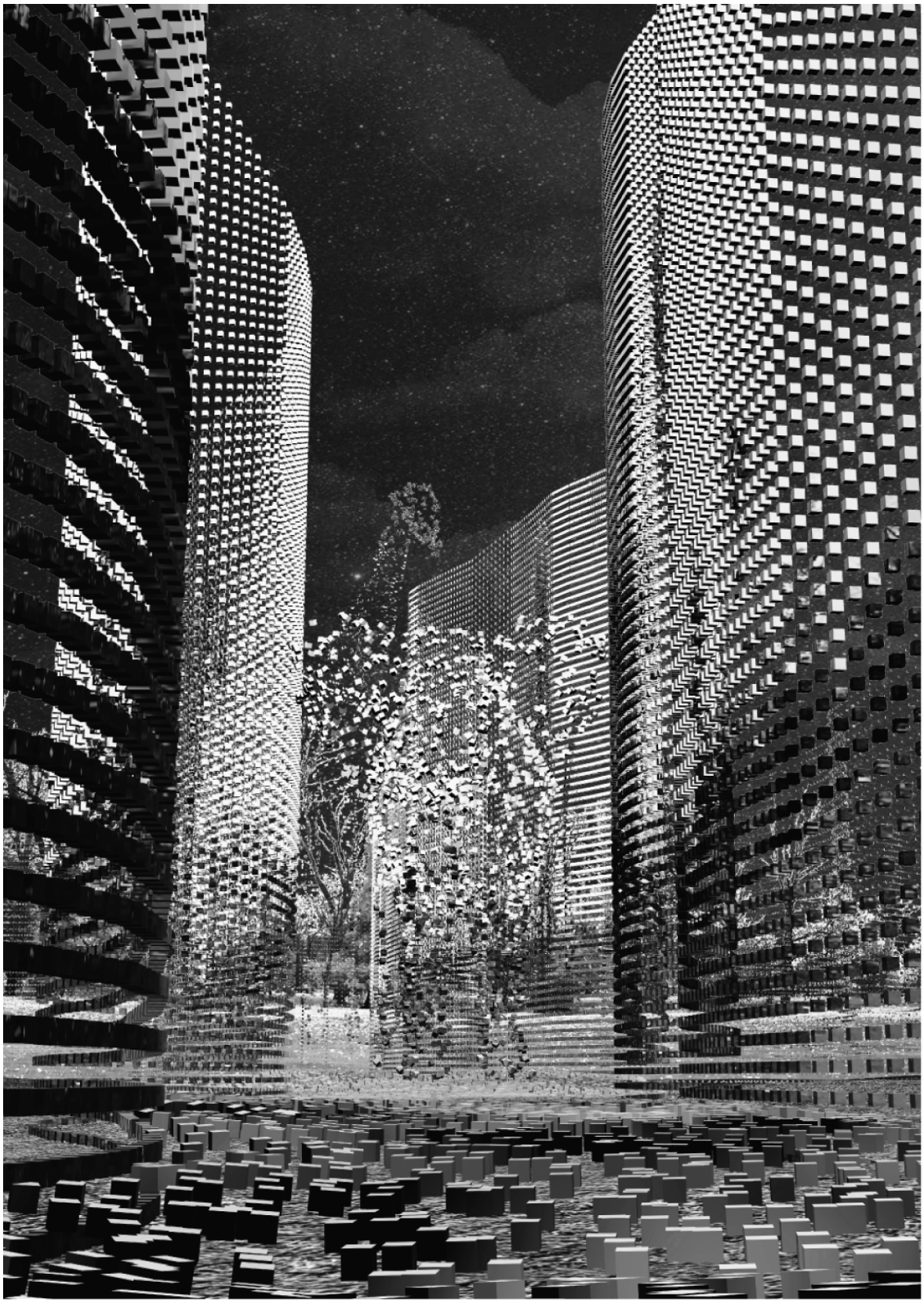


Fig. 19 Cube-scape rendering

Fig. 20 Audio and visual

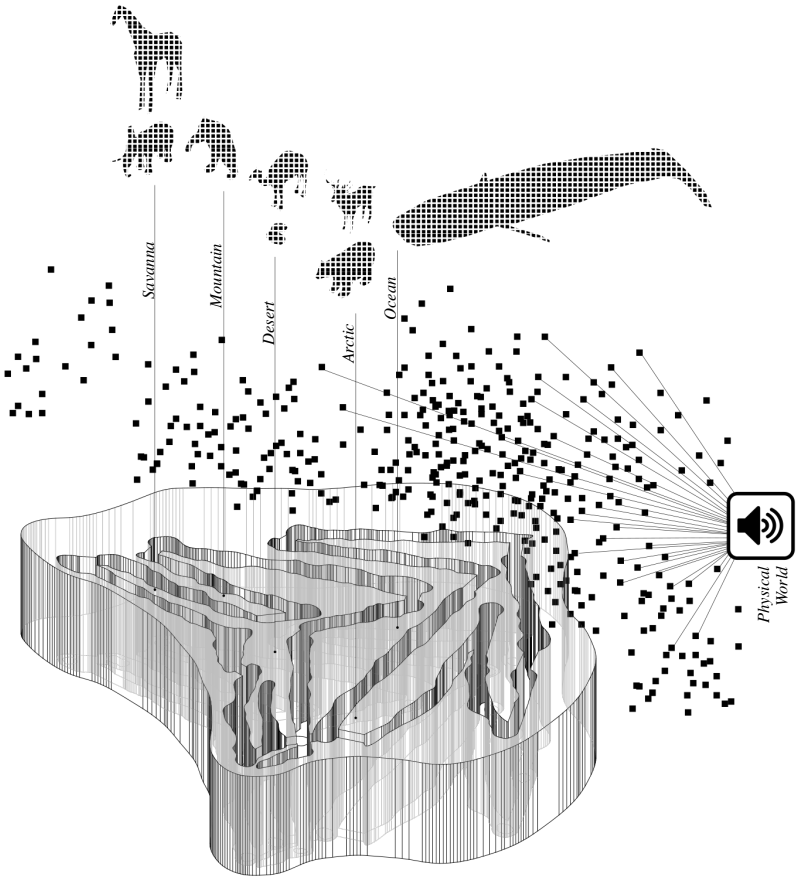
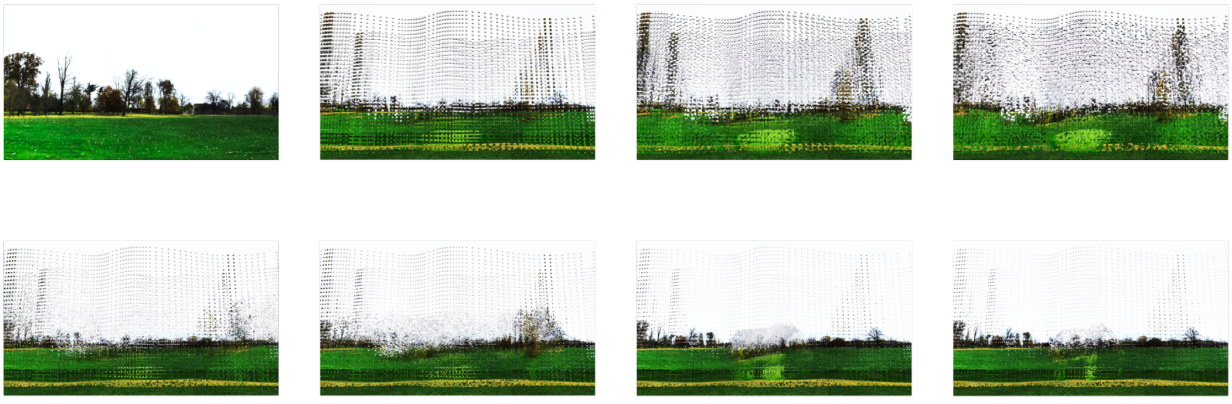
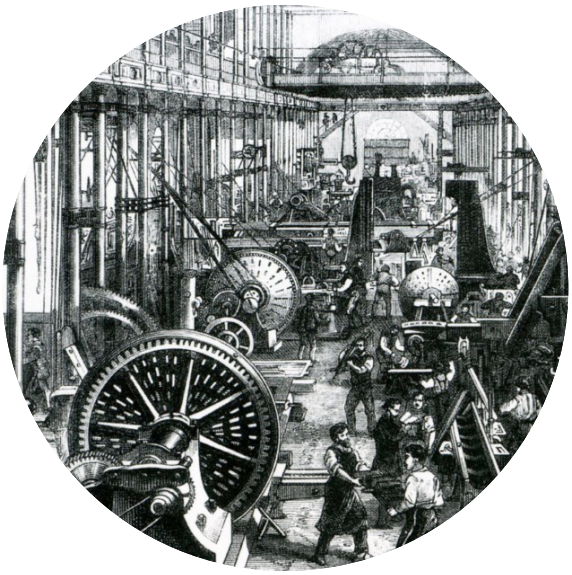


Fig. 21 Selected footage from the project video



Strategic Retooling, 2019



Instructor / Aleksandr Mergold
Location / Charentsavan, Armenia

For every soviet factory in Armenia was as retooling plan in case of the need to switch to war footing. There was, however, no plan in case of a collapse of a country.

The proposal is to retool the factories, and the city around it, using both the absolute machines found locally and the population whose only skill is to operate those machines.

The project incorporates the design of an interface between machine and human, which provides a possible solution for rejuvenating the industrial zone of Charentsavan in Armenia.

According to the site travel, Charentsavan is facing different aspect of depression, it ranges from the local community to the old factories.

The design proposes a methodology of transforming old machines into a series of playful spatial experience with Armenian identity for individuals via translating rotational motion from milling and lathe machines.

It aims to bring everyone together to celebrate Charentsavan as an industrial city in Armenia, and provide happy atmosphere within this city, such as Armenian festivals, and a series of amusement equipments.

In addition, through "Do It Yourself" culture in Armenia, we intend to invite the public to participate the notion of strategic retooling, and to endow those old machines in every household with opportunity to be something fun and playful. And thus, they are able to share the happiness to their neighborhood.

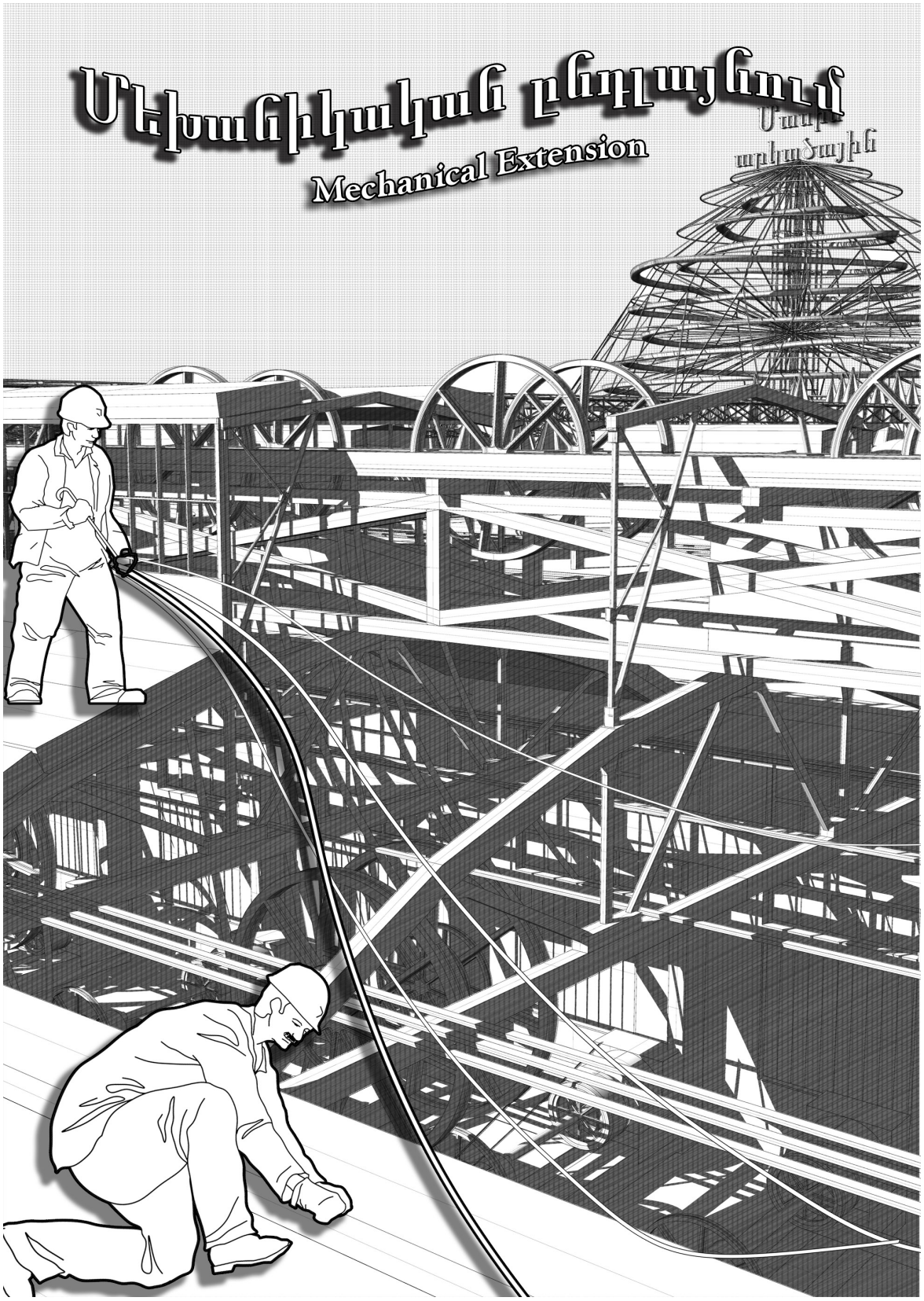


Fig. 22 Mechanical extension

Fig. 23 Collage

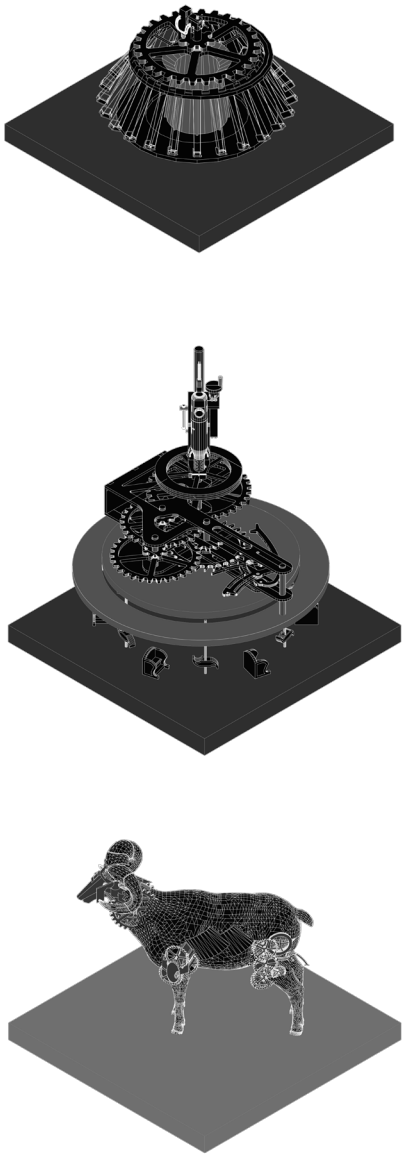


Fig. 24 Mechanical prototypes

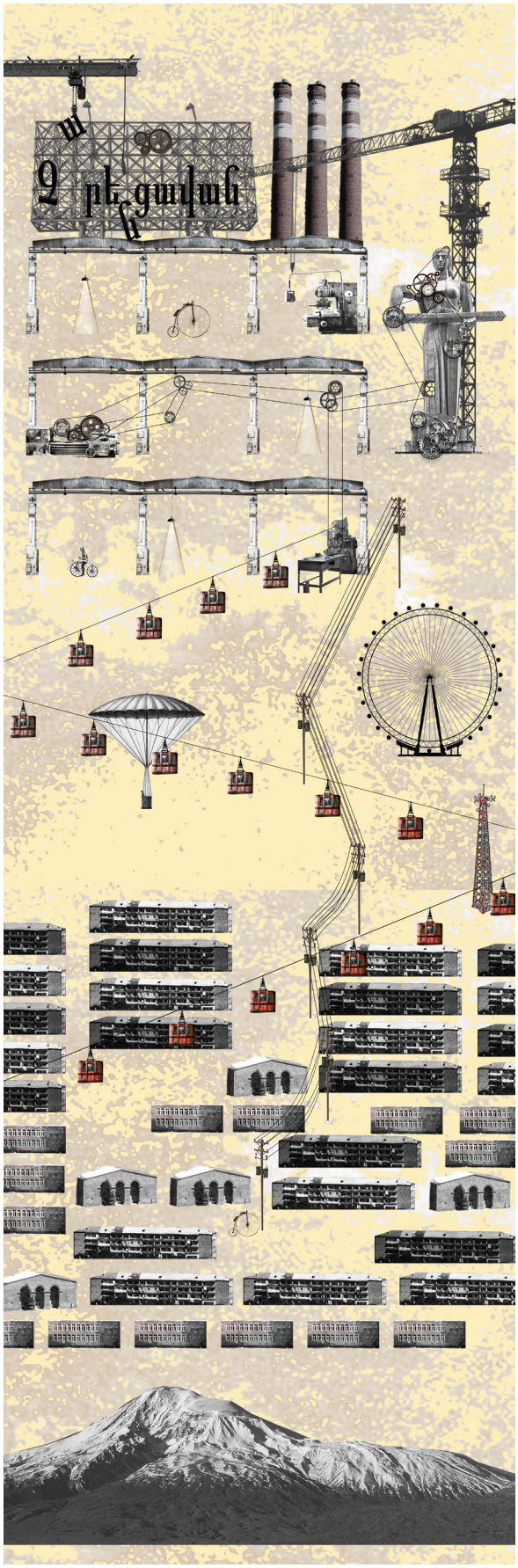


Fig. 25 Diagrammatic drawing

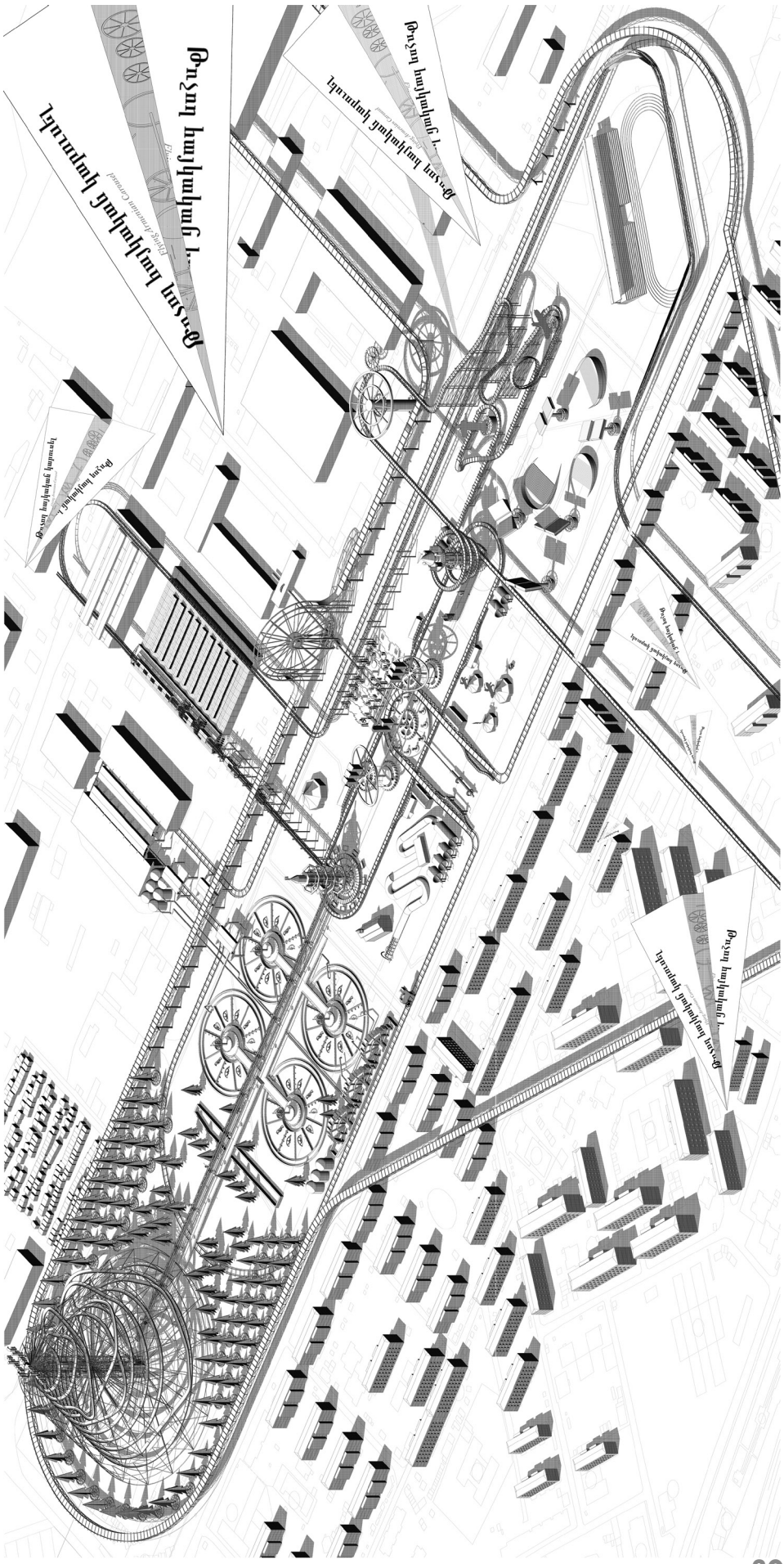


Fig. 26 Axonometric plan

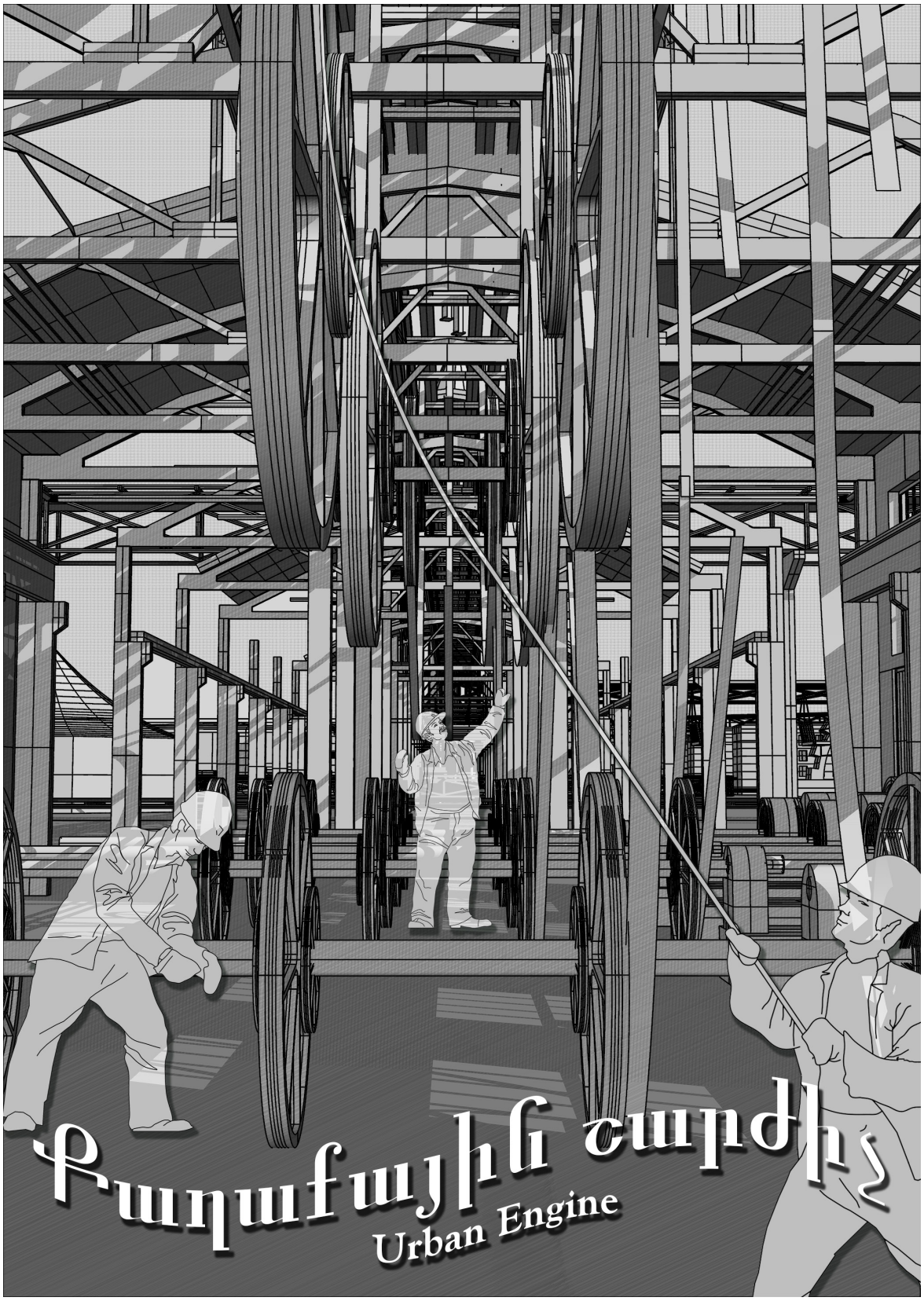


Fig. 27 Urban engine

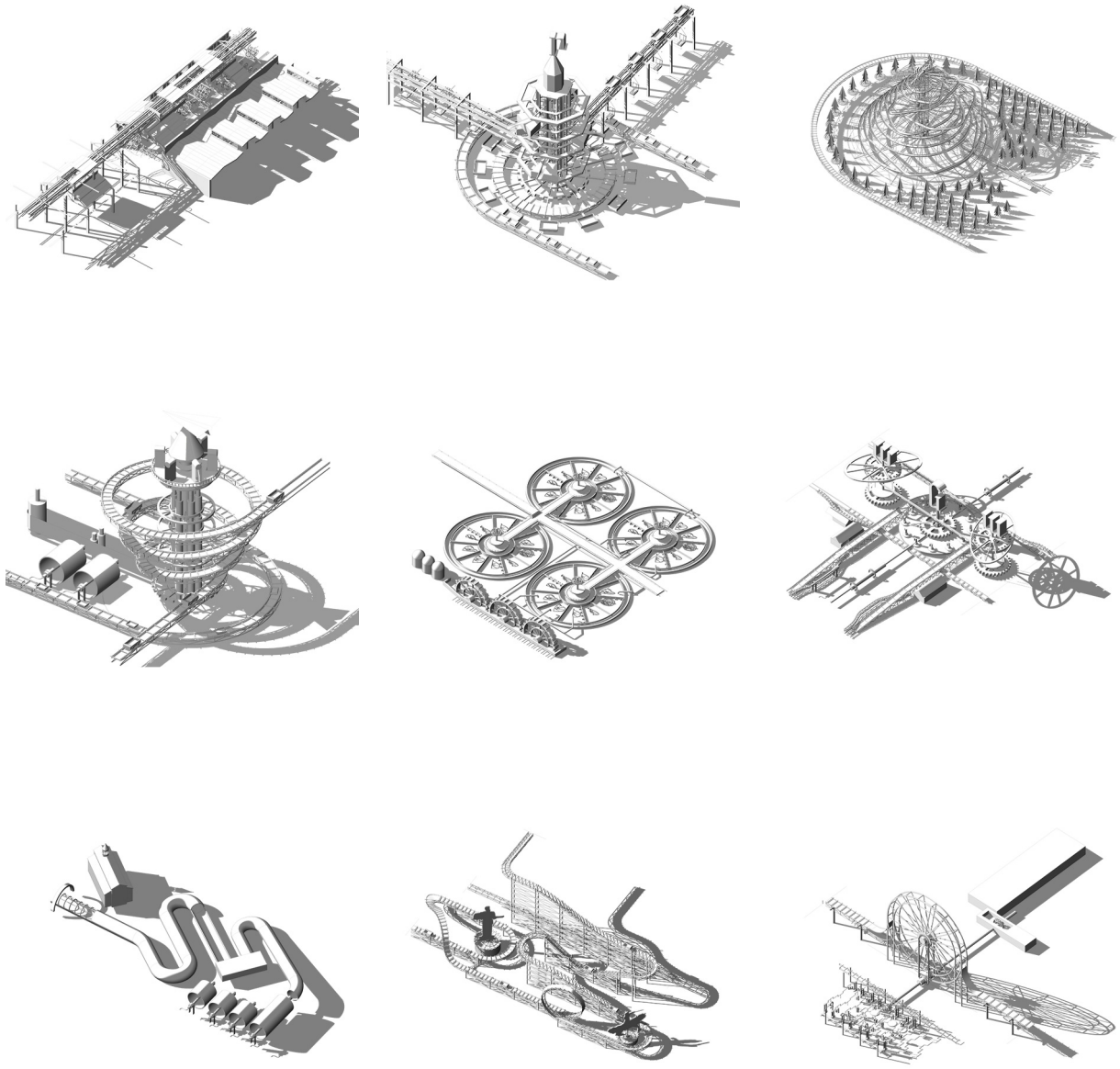


Fig. 28 Typology of urban engine

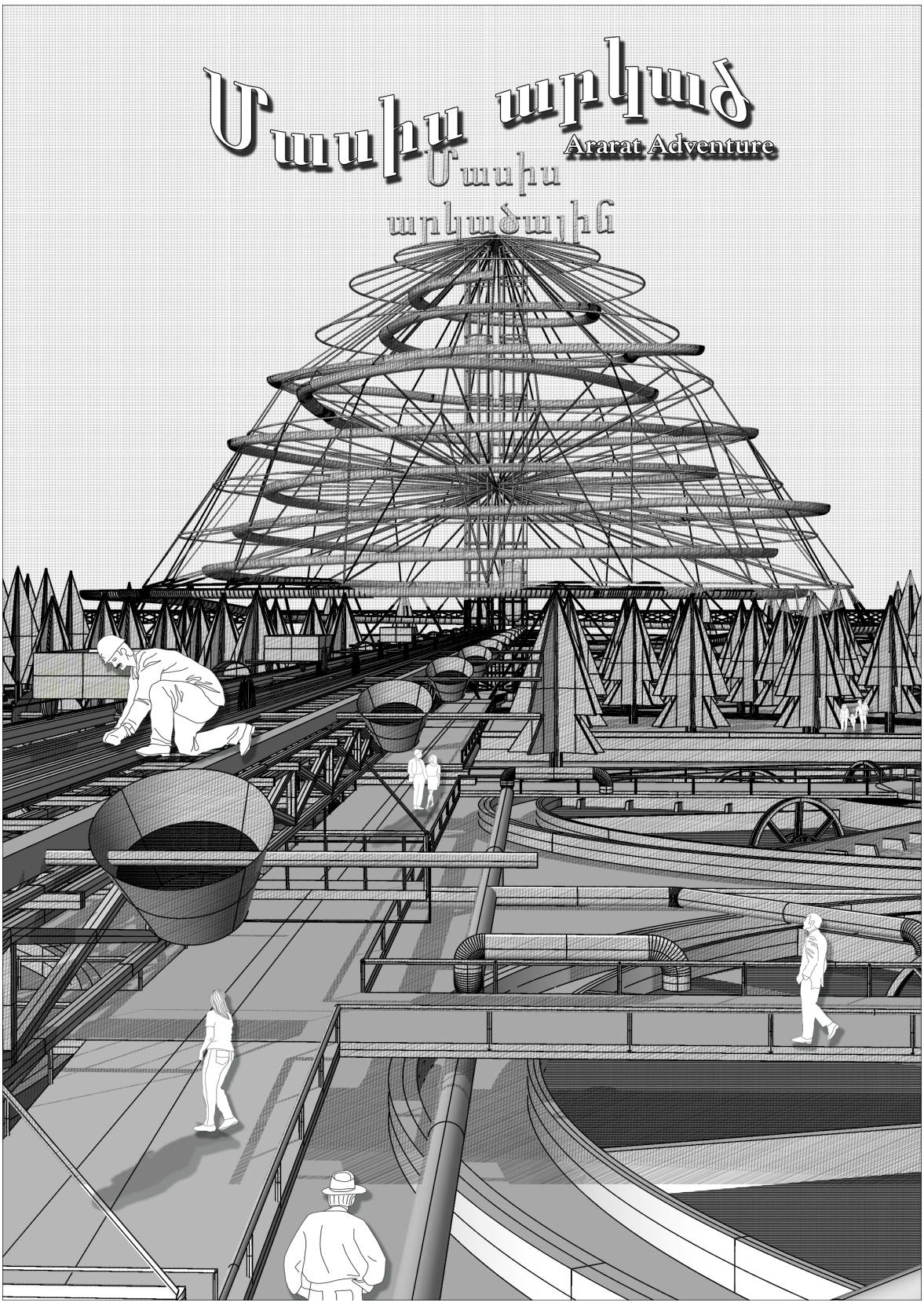


Fig. 29 Ararat adventure, the urban engine

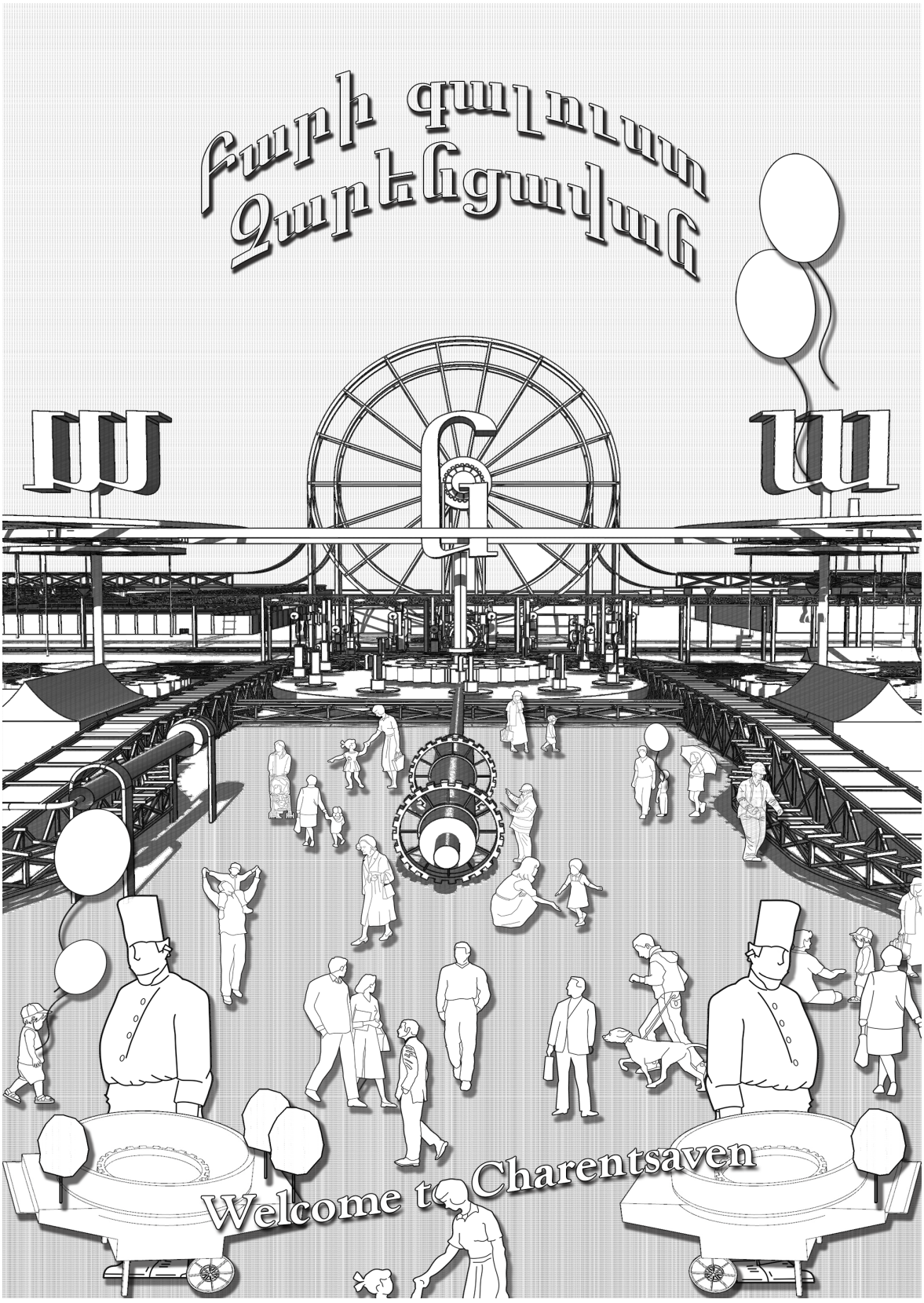


Fig. 30 Ferris wheel, the urban engine

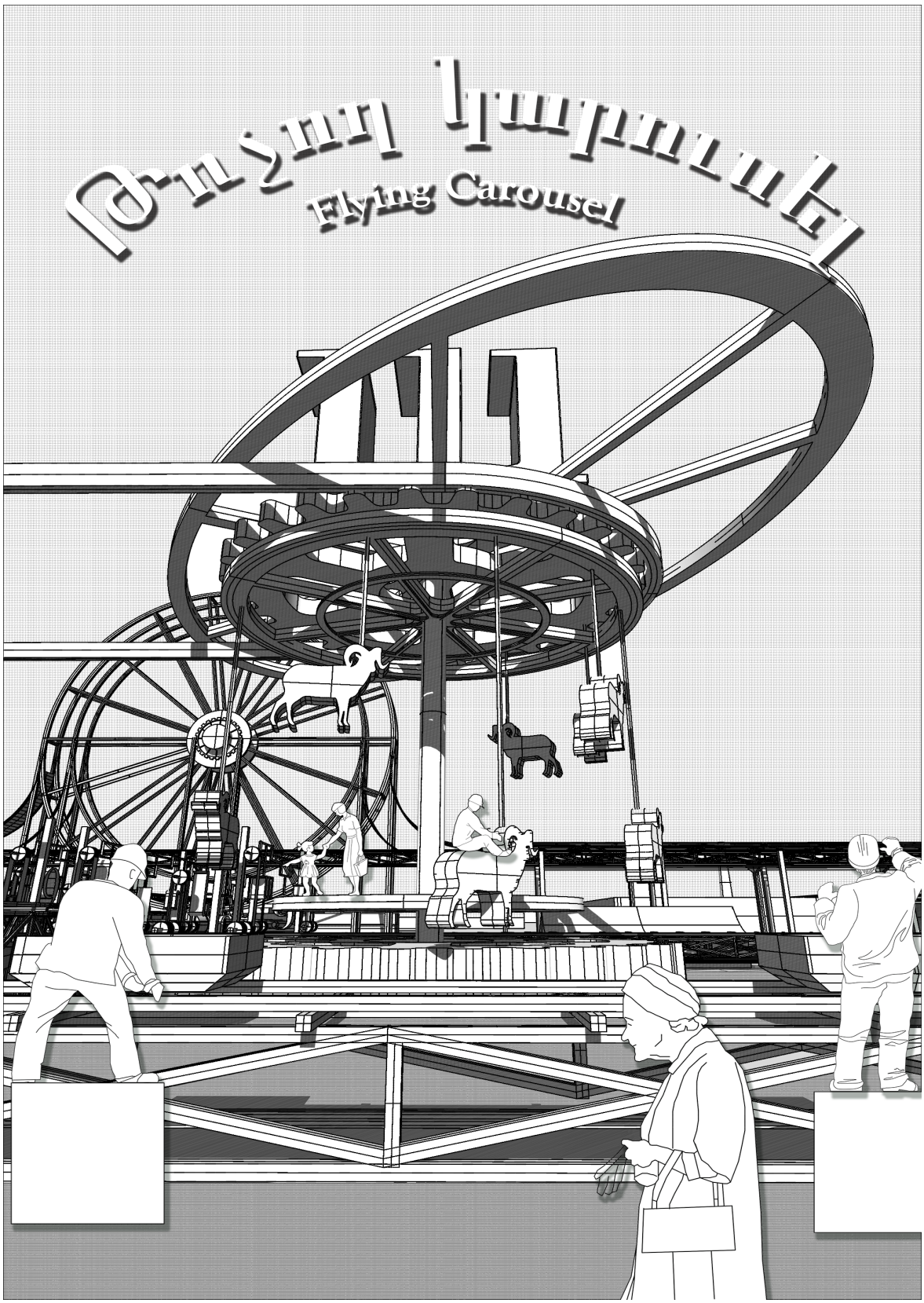


Fig. 31 Flying carousel, the urban engine

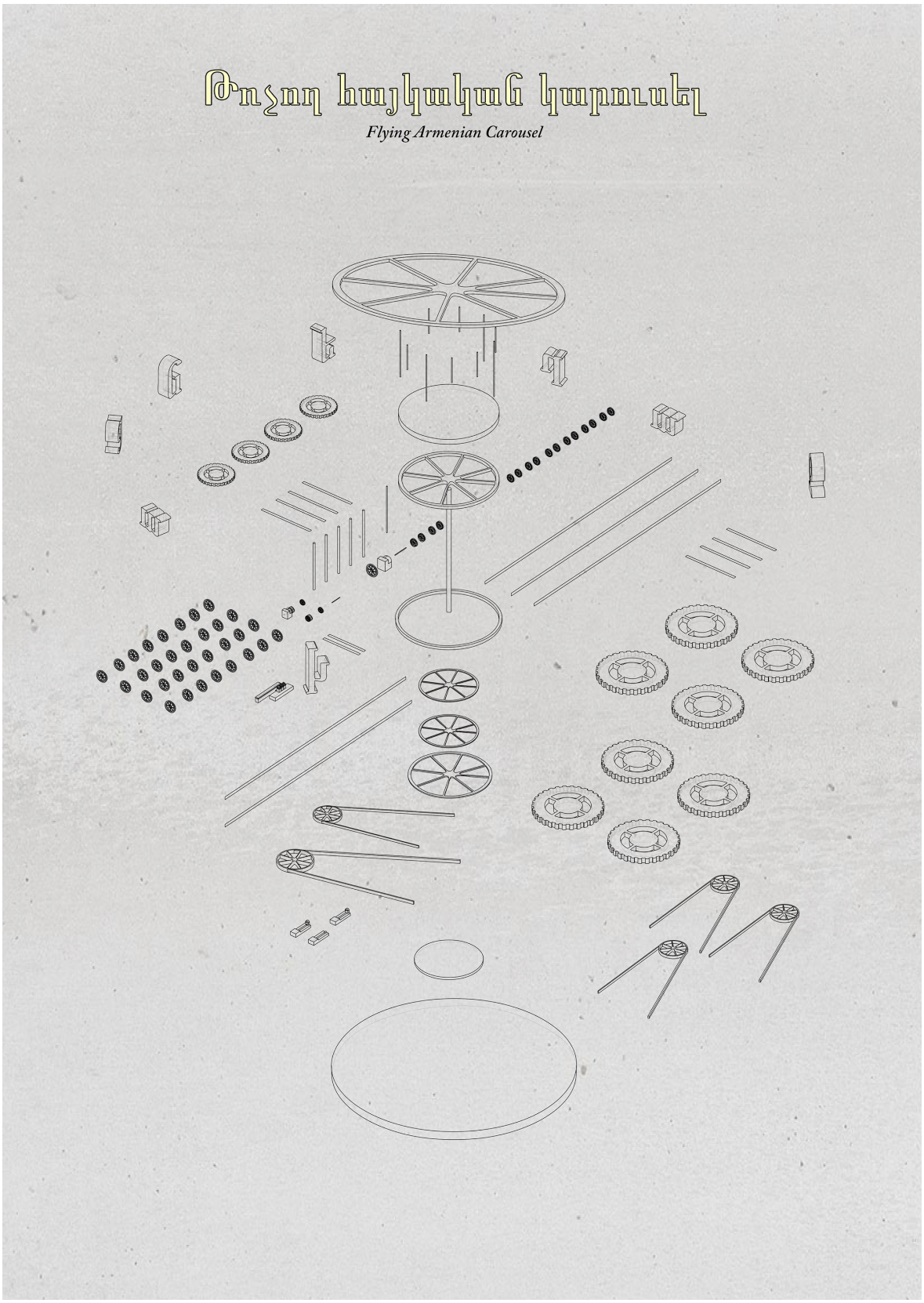


Fig. 32 Exploded axonometric drawing of the flying carousel

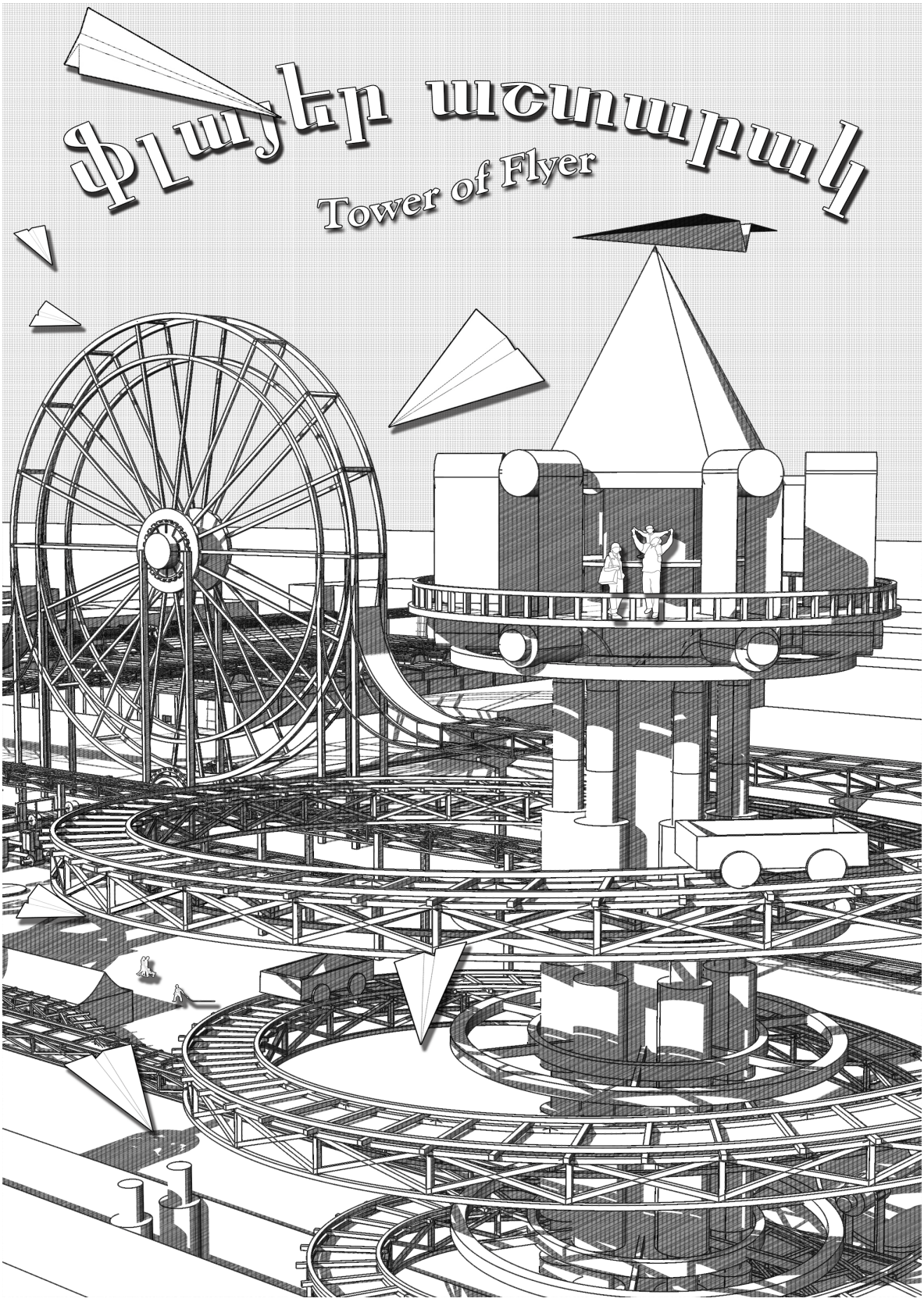


Fig. 33 Tower of flyer, the urban engine

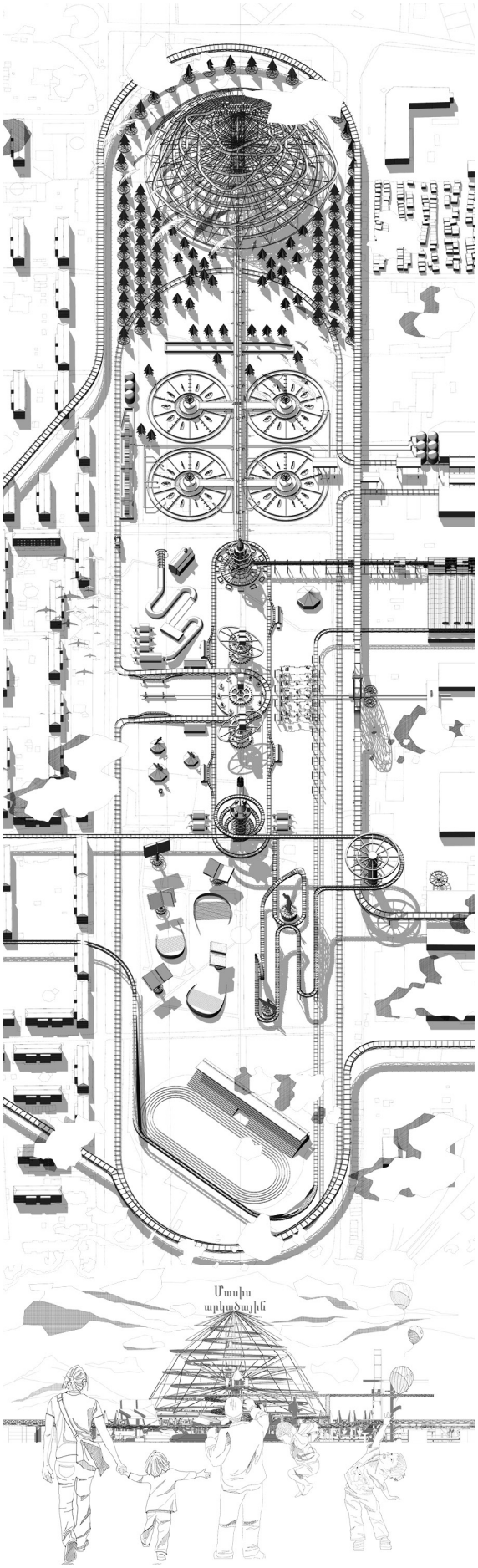


Fig. 34 Master plan

Second Nature, 2019

Instructor / Mauricio Pezo, Sofía von Ellrichshausen

The grey is the cloudy sky, the dark green the vegetation, the nut brown is the landscape.

All of these we have taken for granted for a very long time.

Through translating from painting to painting, nature is no longer nature: It has been transforming into "second nature," which is the amorphous colored elements in my painting. Lacking sufficient detail for people to recognize their original identity, they seem, upon close inspection, meaningless. Nevertheless, as these amorphous elements are brought together, a "natural" landscape emerges.

As I created these paintings, Lo-fi music from album "2814" was played constantly in the background.

It was surprising for me to discover how the different colors blend into one another to generate the unique color tone, and thus become something similar to nature in an abstract manner. Through a process of pixelating the original painting, it is transformed into a new painting, which no longer belongs to the original artist. This can be compared to the way lo-fi music is produced, in which chunks of sounds are pieced together to construct music with a characteristically lower quality sound by contemporary musical standards, but which performs as an entirely distinct musical aesthetic.

Sky, cloud, trees, earth, grass, bushes, and shrubs are the elements in my painting.

The process of painting seems like a ritual of de-materialization. Through neglecting the detail of each natural element with linear brush marks, the tree is rendered with darker and lighter green; the earth is painted with black and brown; the bushes are reduced to slabs of dark slate gray.

As a digital photograph is enlarged and its pixelated construction reveals itself, or as a piece of digital music seems to degrade as it is de- and reconstructed from chunks of sound, in the same way, the sequential enlargement of the painting – from A5 to A1 – begins to reveal the hand of the artist. Whilst each painting is twice the size of the previous, the resolution remains constant and the pixel brush marks of the artist become more and more stark.

Fig. 36 (top) A1 painting ; Fig 37 (bottom) A2 paintings

Fig. 38 A3 paintings

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